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On Trees in Paddy Fields in Northeast Thailand

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I Introduction

In contrast to the open spread of paddy fields in the Central Plain (Chao Praya Delta), northeast Thailand is strikingly characterized by the presence of trees. According to the land assessment using the LANDSAT imagery [Wacharakitti 1979], paddy and farm land where trees stand sparsely account for about 60% of the whole area of Khon Kaen and Mahasarakham provinces. The scenery of paddy field and farmland with trees is very common in northeast Thailand.

II Research Sites and Methods

Research on the location and density of trees was done at Ban Sok Muang, Ban Tasala and Ban Non Tan, located

between Khon Kaen and Chumpae, along the national road the Route 12, and Ban Phone Phek, located at Phu Wiang district, along the Route 2038, in the vicinity of Khon Kaen (all sites are 200–240 meters above mean sea level).

Research was made in September 1986, and also in November 1986 after paddy fields dried up and the paddy was harvested.

At each research site, quadrats (50 m × 60 m–50 m × 100 m) were set up, location of trees was mapped; their diameter (DBH) and size of tree crown were estimated; and tree species were identified. In addition, locations of stump, snags and termite mound, etc., were also mapped when found. According to the information obtained at Ban Non Tan and Ban Phone Phek, about 20 years has passed since reclamation. At other two sites, a maximum of 20 years has also elapsed. Paddy fields are not irrigated.

III Results and Discussion

Tree Species and Density

Table 1 shows the tree density, average diameter, basal area and tree species. In addition, Fig. 1 shows the size

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Table 1 Tree Density, Average Diameter and Basal Area

	Density/ha	Average diameter cm (Range)	Basal area m ² /ha
Ban Phone Phek			
<i>Terminalia tomentosa</i>	20.0		2.35
<i>Shorea obtusa</i>	6.7		1.75
<i>Terminalia chebula</i>	3.3		0.26
Total	30.0	42.0 (31.7 - 61.6)	4.37
Ban Sok Muang			
<i>Dipterocarpus tuberculatus</i>	50.0		6.22
<i>Shorea obtusa</i>	13.3		1.07
<i>Dipterocarpus obtusifolius</i>	3.3		0.95
Total	66.6	38.7 (25.5 - 60.3)	8.24
Ban Non Tan			
<i>Diospyros rhodocalyx</i>	46.0		0.94
<i>Sindora siamensis</i>	12.0		0.19
<i>Lagerstroemia calyculata</i>	6.0		0.21
<i>Nauclea orientalis</i>	4.0		0.34
<i>Shorea siamensis</i>	2.0		0.18
<i>Dalbergia nigrescens</i>	2.0		0.17
<i>Terminalia chebula</i>	2.0		0.12
<i>Xylia xylocarpa</i>	2.0		0.10
<i>Pterocarpus macrocarpus</i>	2.0		0.02
<i>Diospyros mollis</i>	2.0		0.02
<i>Canarium kerrii</i>	2.0		0.03
<i>Cassia garrettiana</i>	2.0		0.02
Total	84.0	17.4 (8.9 - 36.4)	2.35
Ban Tasala			
<i>Shorea obtusa</i>	108.6		6.81
<i>Dipterocarpus tuberculatus</i>	34.3		3.33
<i>Xylia xylocarpa</i>	2.9		0.42
<i>Terminalia tomentosa</i>	2.9		0.33
Total	148.7	30.0 (20.7 - 43.5)	10.89

class distribution and Fig. 2 the location maps of trees in each sites. The least density (30 trees/ha, basal area 4.4 m²/ha) was recorded at Ban Phone Phek where average diameter (DBH 42 cm) was highest. It distinctly shows

that big trees were left sparsely. The maximum (148.7 trees/ha and 10.9 m²/ha) density was recorded at Ban Tasala. The size of *Dipterocarpus tuberculatus* is usually bigger than that of *Shorea obtusa*.

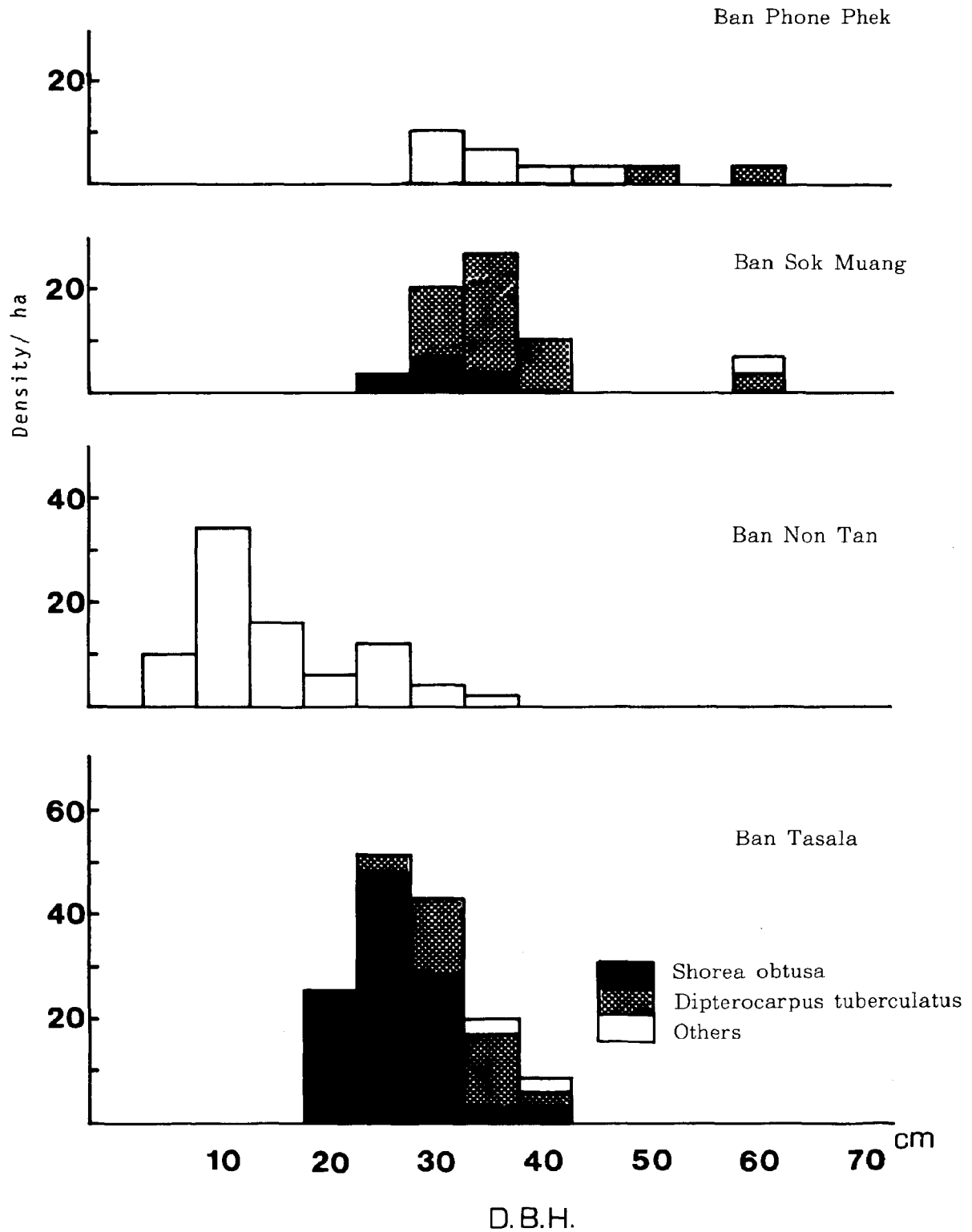


Fig. 1 Size Class Distribution of Trees at Each Site

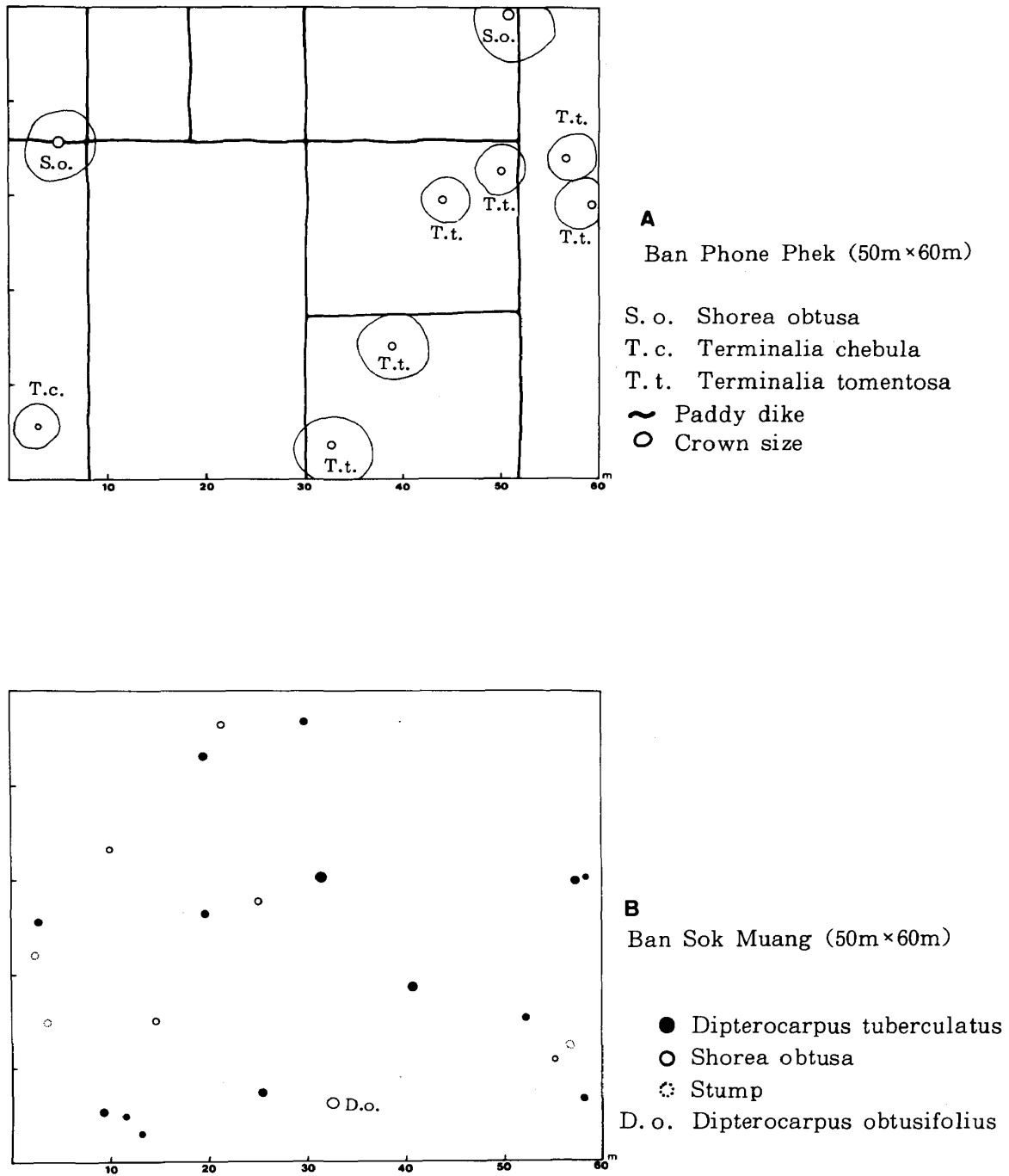


Fig. 2 Maps of Tree Location at Each Site

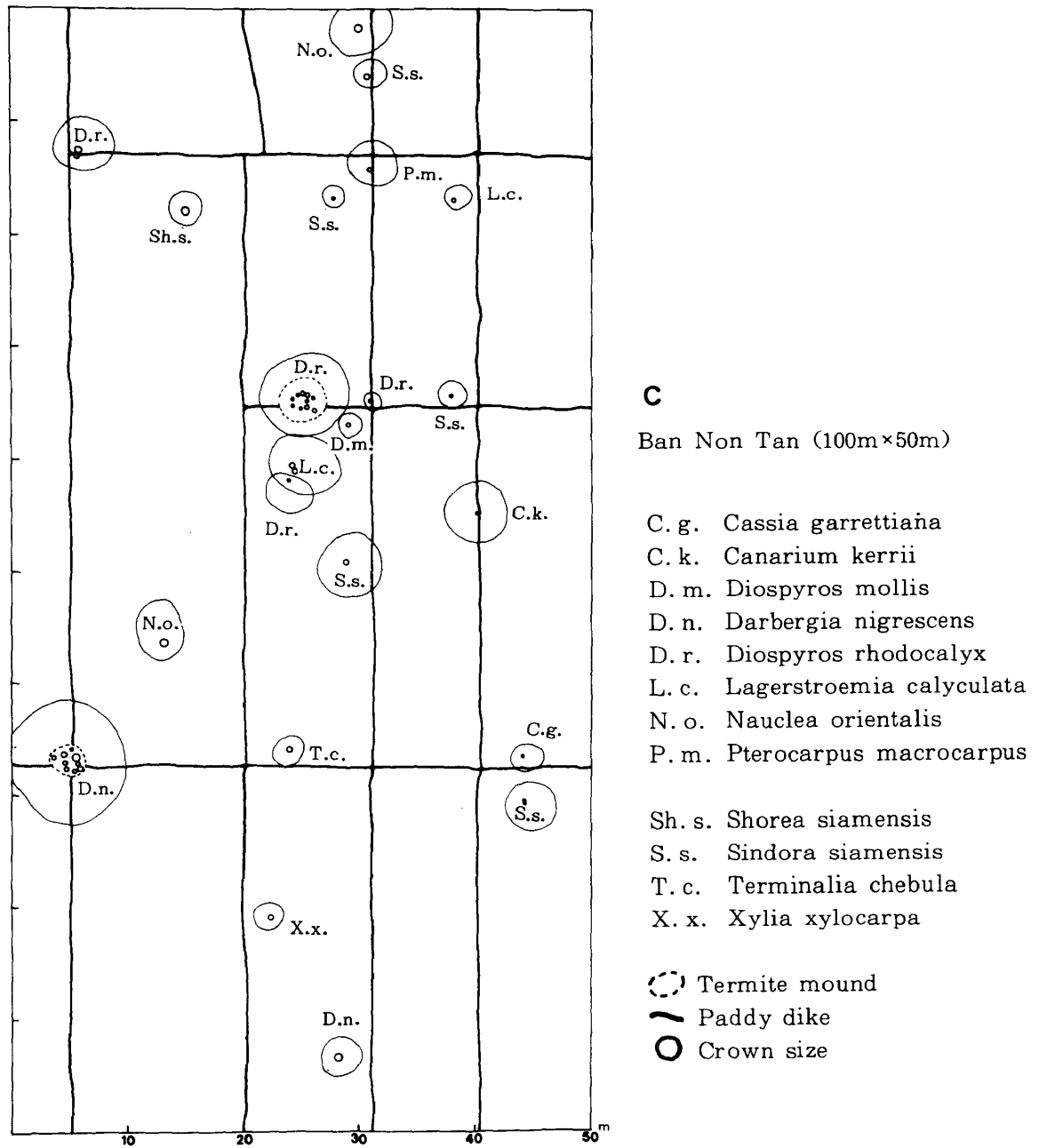


Fig. 2 Continued

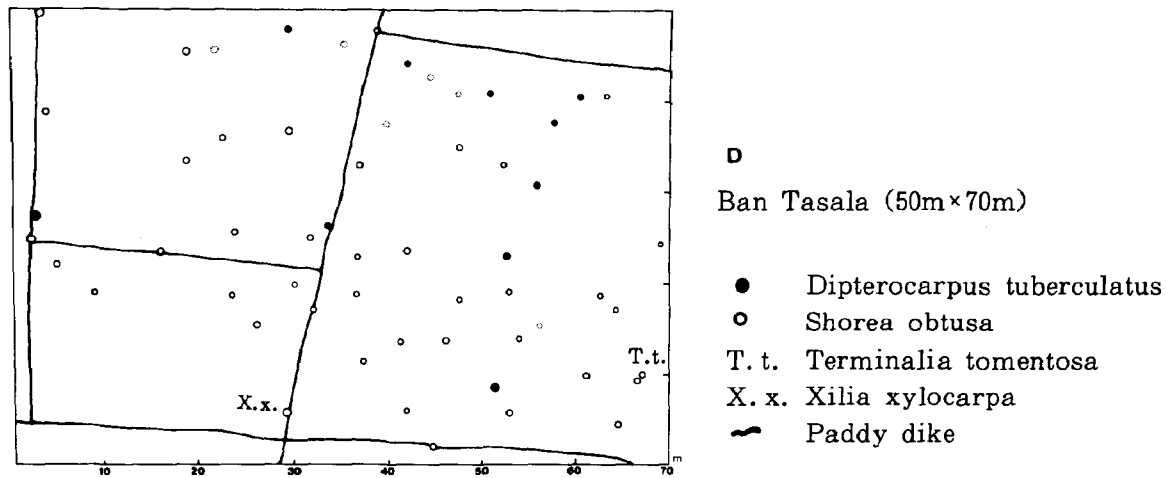


Fig. 2 Continued

Tree species also vary greatly from site to site. At Ban Phone Phek with the lower density, *Terminalia tomentosa* was the major tree mixed with other two *Shorea obtusa* and *T. chebula*. At Ban Sok Muang, *Dipterocarpus tuberculatus* was dominant, and *S. obtusa* and *D. obtusifolius* were also found. These trees belong to the Dipterocarpaceae.

On the contrary, at Ban Tasala, *S. obtusa* was dominant and *D. tuberculatus* was the next dominant, and *Xylia xylocarpa* and *T. tomentosa* occurred instead of *D. obtusifolius*. At Ban Non Tan, twelve tree species, *Diospyros rhodocalyx*, *D. mollis*, *Sindora siamensis*, *Lagerstroemia calyculata*, *Nauclea orientalis*, *Dalbergia nigrescens*, *Canarium kerrii*, *Cassia garrettiana* and *Shorea siamensis* were found while total basal area was the lowest. The difference in the composition of tree species clearly reflects the differences in the original

vegetation and there was no tree recognized as planted or introduced after reclamation to paddy fields.

Wacharakitti [1979] described that the average density of trees in an undisturbed Dry Dipterocarp Forest in this area was 468 trees/ha and that of paddy field was 51/ha with a volume of 12.7 m³/ha (equivalent to 19.3 t/ha). In this study the maximum density in the paddy field was 150/ha but clearly much less than density in the surrounding forest.

Regarding trees found in the paddy fields, Grandstaff *et al.* [1986] listed 54 species at least 18 of which were evidently introduced, including lontar palm (*Borassus flabellifer*) and raintree (*Samanea saman*). They suggested that density and composition depended on ages of the paddy fields, among other factors.



A : Ban Phone Phek



B : Ban Sok Muang



C : Ban Non Tan



D : Ban Tasala

Fig. 3 Scenery of Trees in the Paddy Fields

Table 2 Uses of Trees in Paddy Fields

Local name	Scientific name	Major use	Specific use
Dipterocarpaceae			
Hiang/Saad	<i>Dipterocarpus obtusifolius</i>	Trunk : C	Resin : Torch
Kung/Pluang	<i>D. tuberculatus</i>	Trunk : C	Leaf : Wrapping, Resin : Torch
Chik/Teng	<i>Shorea obtusa</i>	Trunk : C, F	
Rang/Hang	<i>S. siamensis</i>	Trunk : C, F	
Combretaceae			
Rok Fah	<i>Terminalia chebula</i>	Trunk : T	Fruit : Tanning, Edible
Sa Mo Tai	<i>T. tomentosa</i>	Trunk : T	Bark : Dyeing, Tanning
Ebenaceae			
Muklua	<i>Diospyros mollis</i>	Trunk : T, F	Fruit : Dyeing, Medicine
Ta Ko Na	<i>D. rhodocalyx</i>	Trunk : T, F	Fruit : Edible, Dyeing
Leguminosae			
Khi Lek Pa	<i>Cassia garrettiana</i>	Trunk, Branch : F	
Pradu	<i>Pterocarpus macrocarpus</i>	Trunk : C, T	Leaf : Fodder, Bark : Dyeing
Tae	<i>Sindora siamensis</i>	Trunk : T, F	
Cha Nuan	<i>Dalbergia nigrescens</i>	Trunk : T, F	
Mai Daeng	<i>Xylia xylocarpa</i>	Trunk : C, T, F	
Rubiaceae			
Kra Tum Nam	<i>Nauclea orientalis</i>	Trunk : C, T, F	
Lythraceae			
Tabaek	<i>Lagerstroemia calyculata</i>	Trunk : T	
Burseraceae			
Ma Kerm (Ma Kok Luem)	<i>Canarium kerrii</i>	Trunk : T	Fruit : Edible

C : Construction T : Tool and Furniture F : Fuel

Use of Trees

Table 2 shows the tree species found in the study sites and their uses indicated in interviews with farmers. Most important and daily uses of trees are 1) to gather fuel wood by collection of fallen branches and branches pruned to moderate the shade to paddy, and 2) shade for livestock and human in intervals of work. As described by Subhadhira *et al.* [1988], shortage of fuelwood due to the conversion of woodland to agricultural land in this region has become a seri-

ous problem.

In addition to the uses mentioned above, large leaves of *Dipterocarpus tuberculatus* are used for wrapping. Young leaves of Legume trees, such as *Pterocarpus macrocarpus* and *Cassia garrettiana*, etc., are fodder for livestock, and fruit of *Terminalia chebula*, *T. tomentosa*, *Diospyros mollis* and *D. rhodocalyx*, are for tanning and dyeing. Of course, big trunks of *Dipterocarpus tuberculatus*, *D. obtusifolius* and *Shorea obtusa* are used for construction and also making tool or furniture. Surely,



Fig. 4 Eucalyptus Planted on the Paddy Dikes (at Somdet)

those big trees are valuable property.

It can be said that trees in the paddy fields is usually left not for one specific purpose of use, but rather for multi-purpose or multi-uses. Farmers are still wedded to this traditional agro-forestry systems. For example, at Somdet near Mahasarakham, *Eucalyptus camaldulensis* is planted on the paddy dikes where paddy fields were newly opened and no native trees left (Fig. 4).

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